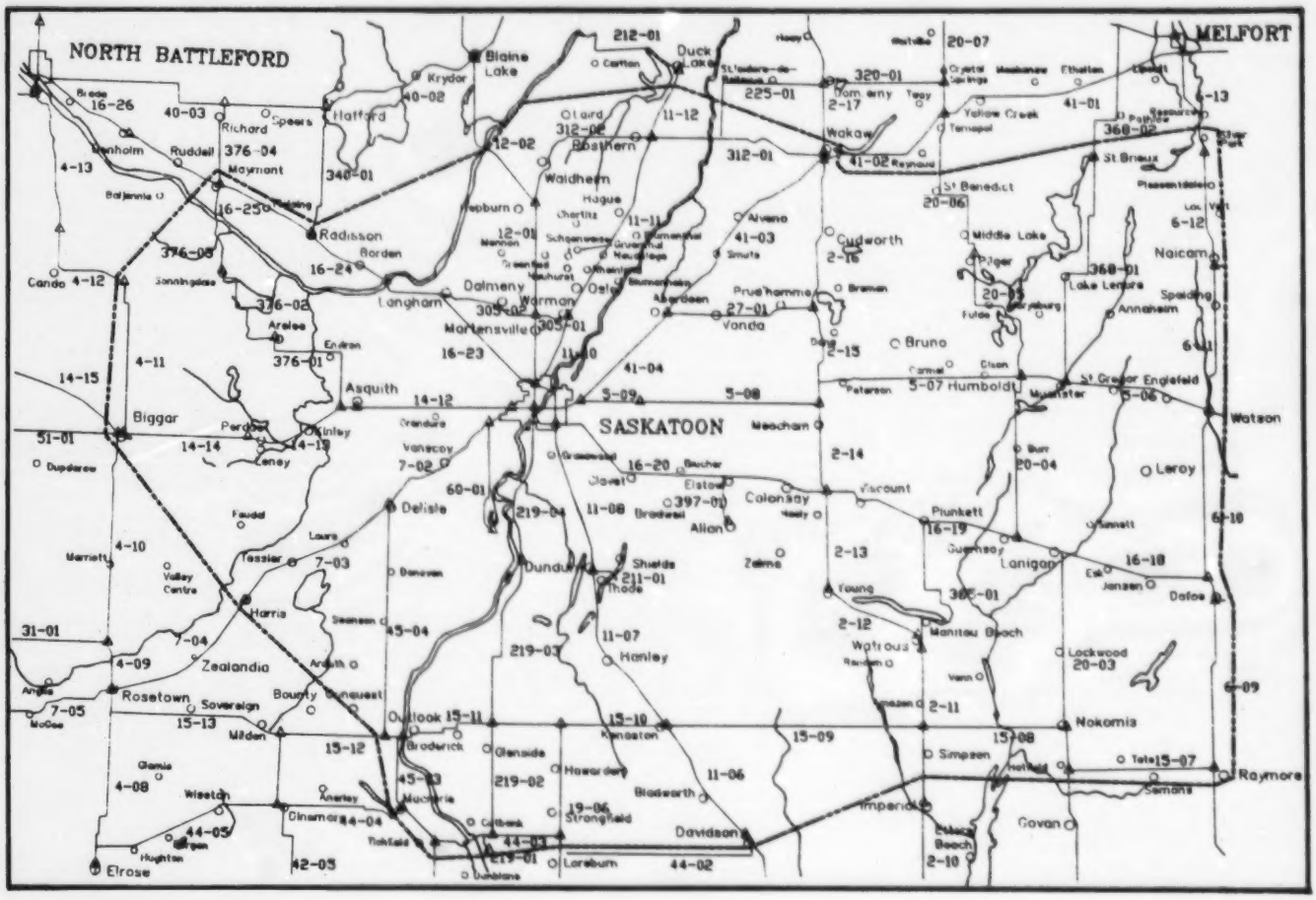
EXECUTIVE SUMMARY REPORT

SASKATOON REGIONAL RURAL HIGHWAY PLANNING STUDY



JUNE, 1992

DELCAN ENGINEERS PLANNERS LANDSCAPE ARCHITECTS

Saskatchewan Highways and Transportation

102-06367/

DELCAN ENGINEERS PLANNERS LANDSCAPE ARCHITECTS

July 10, 1992 Ref. No. 15-1433-A-00

Mr. Mike Hossack, P.Eng.
Saskatchewan Highways and
Transportation
1855 Victoria Avenue
Regina, Saskatchewan
S4P 3V5

Dear Mr. Hossack:

Re: Saskatoon Regional Rural Highway Planning Study

We are pleased to submit the executive summary report for the above-referenced study. This has been a very interesting and challenging assignment and we feel confident our results will aid you in transportation planning for the Saskatoon District.

We would like to take this opportunity to thank the members of the Steering Committee as well as the staff of Saskatchewan Highways and Transportation. Your cooperation and participation in this study has been greatly appreciated.

We look forward to working with Saskatchewan Highways and Transportation on future studies and wish you every success in the implementation of the improvement plans generated in this report.

Sincerely,
Delcan Western Ltd.

Dave Kohut

David P. Kohut, P.Eng.
Transportation Manager
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DPK:klb

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SASKATOON REGIONAL RURAL HIGHWAY PLANNING STUDY

EXECUTIVE SUMMARY REPORT

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15-1433

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CHAPTER 1

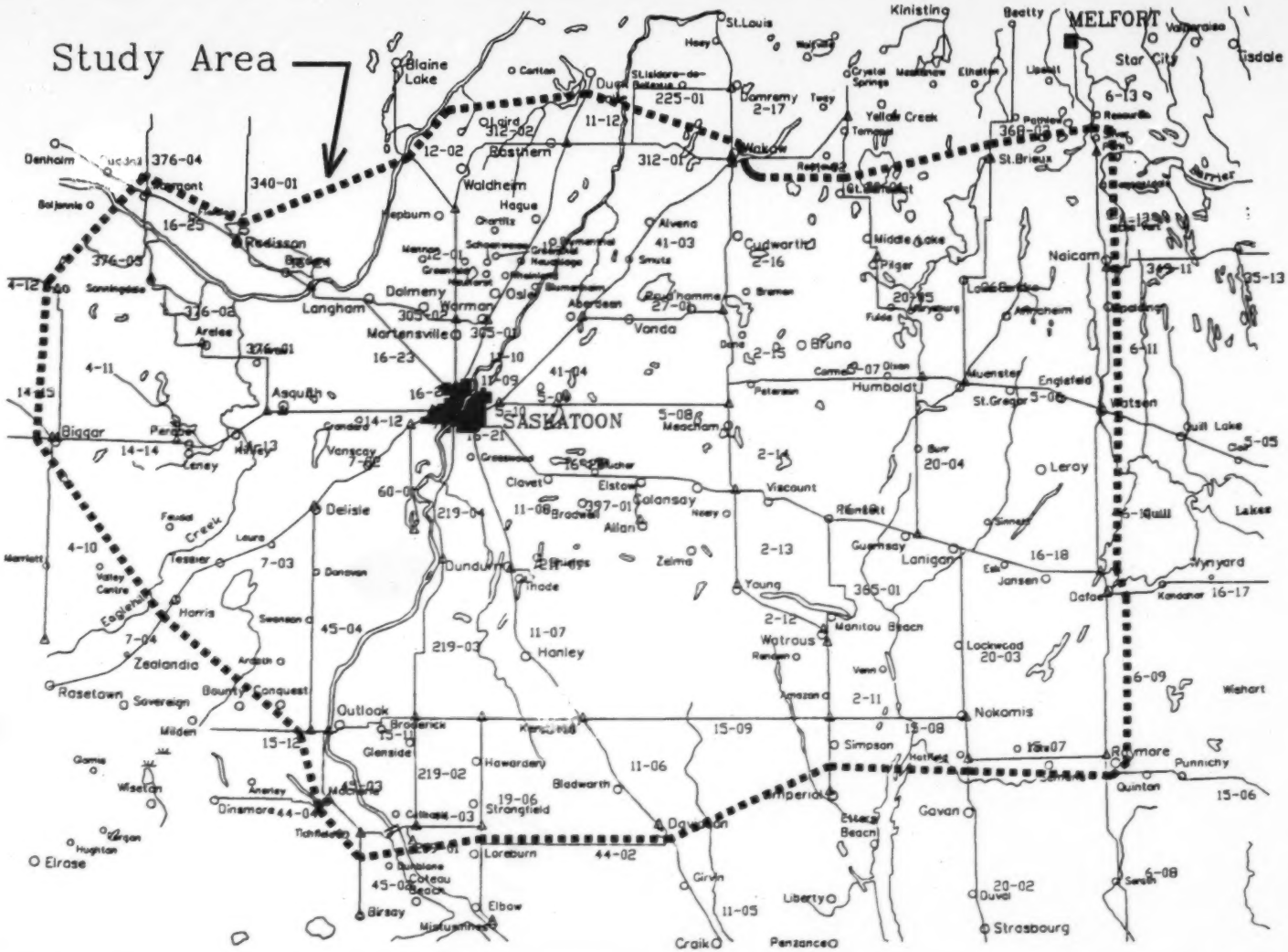
INTRODUCTION AND BACKGROUND

1.1 Introduction

In the fall of 1990, the Saskatchewan Highways and Transportation (DHT) commissioned Delcan Western Ltd. to undertake a transportation planning study of the Saskatoon District.

The implementation of such a study is appropriate as the most recent prior study was completed 17 years earlier. The development of short and long range transportation plans, which comprise a major portion of the study, is critical to the organized and efficient development of the Department's highway system and the areas it serves. The transportation plans help facilitate the effective management of all DHT resources be they financial, labour, equipment or material.

The transportation plans will also help to assess the impact of reducing, delaying, eliminating or accelerating specific or general transportation improvements. The plans will also assist DHT in assessing the need to add, maintain or remove access controls on highways throughout the Saskatoon District. The limits of the study area are shown in ***Figure 1.1.***


Study Area
SASKATOON
MELFORT
Blaine Lake
Radisson
Langham
Dalmeny
Warman
Martensville
Waldheim
Hague
Rosthern
Wakaw
Cudworth
Naicam
Humboldt
Watson
Delisle
Dundurn
Clavet
Colonsay
Viscount
Lanigan
Leroy
Young
Watrous
Manitou Beach
Nokomis
Wynyard
Quill Lake
Outlook
Hanley
Rosetown
Zealandia
Biggar
Kinistino
Star City
Tisdale
Melfort
St.Louis
Domremy
Yellow Creek
St.Brieux
Middle Lake
Pilger
Lake Lenore
Meacham
Bruno
Englefeld
St.Gregor
Guernsey
Jansen
Watson
Wishart
Punnichy
Quinton
Rosthern
Simpson
Imperial
Bladworth
Strongfield
Davidson
Gravelbourg
Liberty
Craik
Penzance
Girvin
Elbow
Loreburn
Coteau Beach
Elrose
Birsay
Dinsmore
Gravelbourg
Strasbourg
Gavan
Duval
Lockwood
Amazon
Ranson
Hawarden
Glenside
Broderick
Kerrobert
Zelma
Allan
Bradwell
Elstow
Meacham
Aberdeen
Vanda
Osler
Borman
Alvena
Smuts
Paddockwood
Carrot River
Arelee
Asquith
Perdue
Biggar
Laura
Tessier
Harris
Eagle Hill
Swanson
Donavon
Conquest
Sovereign
Milden
Wiseton
Dinsmore
Outlook
Broderick
Glenside
Hawarden
Bladworth
Strongfield
Davidson
Loreburn
Elbow
Birsay
Craik
Penzance
Liberty
Girvin
Gravelbourg
Strasbourg
Gavan
Duval
Lockwood
Nokomis
Simpson
Imperial
Punnichy
Quinton
Rosthern
Wishart
Wynyard
Quill Lake
Watson
Humboldt
Bruno
Naicam
Middle Lake
Pilger
Lake Lenore
Meacham
Englefield
St.Gregor
Guernsey
Jansen
Leroy
Viscount
Lanigan
Young
Watrous
Manitou Beach
Hanley
Zelma
Allan
Bradwell
Elstow
Colonsay
Clavet
Dundurn
Delisle
Rosetown
Zealandia
Biggar

1.2 Study Objectives

The primary objectives of the study were:

1. To identify and analyze the short, intermediate and long term highway transportation related demands and problems in the vicinity of Saskatoon. This will entail the development and analysis of alternatives and identification of a recommended solution. Consideration of highway functional design standards, intersection and interchange configurations, estimated capital costs and prioritizing of expenditures. The finished plans will form a regional highway system plan for the Saskatoon District.

2. To develop a strategy to facilitate the management and updating of the highway plan. A micro computer based traffic demand model is required to generate forecast traffic volumes and calculate highway capacities and traffic levels of service. The model output is to be compatible with DHT's Geographic Information System (GIS) Geo SQL, R-BASE and AutoCAD software. The strategy will be used to update the short and long term plans on an ongoing basis as new data becomes available.

1.3 Study Reports

The work carried out during this study has been documented in a number of reports. During the study, the following four progress reports were prepared:

Progress Report No. 1 - Project Work Plan: This report detailed the proposed methodology to be used throughout the study, the proposed study schedule and costs.

Progress Report No. 2 - Data Collection: Process, Validation and Results: This report documented the data collection program and provided details of the subsequent data analysis and expansion.

Progress Report No. 3: This report documented the travel demand model integration with the GIS; the development of the study area origin-destination matrix; and the development of population and employment forecasts.

Progress Report No. 4: This report documented the travel demand model software and structure; the model calibration; and the travel forecasts.

A final ***Technical Report*** was prepared documenting in detail all of the study analyses, findings and recommendations.

This ***Executive Summary Report*** provides an overview of the study and, in condensed form, documents the study results and recommendations. A summary of the study recommendations are contained in ***Chapter 10***.

CHAPTER 2

REVIEW OF SELECTED DHT PROCEDURES AND PRACTICES

This chapter provides an overview of current DHT practices in three areas, a comparison of these practices with those in other highway administration agencies and a recommendation of what modifications, if any, DHT should consider. The areas considered were:

- **application of functional design standards;**
- **twinning warrants;**
- **level of access control.**

2.1 Application of Functional Design Standards

The following basic rural road (divided and undivided) cross section design standards were reviewed:

- **travelled lane width;**
- **inside and outside shoulder widths;**
- **rounding allowances;**
- **sideslopes and backslopes.**

The highways under consideration in the study area are the major arterials, minor arterials or collectors as defined in the DHT's new Functional Highway Classification System to become effective April 1, 1992. Highways in the "Local Highway" classification were not addressed in this study. In identifying the current DHT design standards for the study area highways, the following Department Design Classes were used:

- **Divided Major and Minor Arterials - Design Class 10;**
- **Undivided Major Arterials - Design Class 20;**
- **Undivided Minor Arterials - Design Class 30;**
- **Collector - Design Class 40**

The following source documents were used to compile the appropriate current design standards:

- *Design Manual (Part 1),* August 1981, DHT;
- *Highway Geometric Design Standards 1985,* (Revised February, 1991), Alberta Transportation and Utilities;
- *Manitoba Highways Classification Study,* March 1986, Manitoba Highways and Transportation; and the *Highway Design Manual,* Manitoba Highways and Transportation;
- *Manual of Geometric Design Standards for Canadian Roads,* January, 1986, Transportation Association of Canada (TAC); and
- *A Policy on Geometric Design of Highways and Streets, 1990,* American Association of State Highway and Transportation Officials (AASHTO).

The desirable minimum design standards for the above noted highway cross section elements for both divided and undivided major and minor arterials and for collectors were compared to appropriate standards from the documents listed. The recommended standards differ from current DHT standards in the following cases:

- **Divided Major and Minor Arterials (D130-7430):** Recommend that the inside shoulder width be increased from 1.0 m to 2.0 m. This change in shoulder width will provide compatibility with both Alberta and Manitoba provincial standards and also a greater factor of safety for road users.

- **Undivided Major Arterials (U130-7430):** Recommend that the sideslope be flattened from 5:1 to 6:1. This flattening of the sideslope will allow for improved compatibility between undivided and divided arterial standards. When an undivided arterial is twinned, the outside sideslope, ditch and backslope will not require any modifications.

- **Undivided Minor Arterials (U120-7420):** Recommend that the shoulder width be increased from 2.0 m to 2.5 m and the sideslope be increased from 4:1 to 6:1. These recommended changes to the **desirable** minimum design standards are appropriate given the 120 km/h design speed of this road category.

- **Collectors (U120-7420):** Recommend that the shoulder width be increased from 2.0 m to 2.5 m and the sideslope be increased from 4:1 to 6:1. Again, these recommended changes to the **desirable** minimum design standards are appropriate given the 120 km/h design speed of this road category.

These recommended changes are to DHT desirable minimum design standards and are meant to be used in the preliminary, functional and detailed design of specific highway links. The capacity analysis and development of improvement plans for present and future years as described in subsequent chapters is not affected by these proposed changes.

2.2 Twinning Warrants

Highway links may be twinned or considered for twinning for a variety of reasons. These include:

- System continuity within the province and/or between adjacent provinces;
- Safety concerns or the perception of safety problems by the public;
- Improve existing traffic capacity and/or traffic level of service (LOS);
- Unusually high percentage of truck traffic;
- To provide for future development;
- Existing pavement conditions;
- Special conditions such as the highway section being a portion of the National Highway System;
- Department policy such as the highway classification or type; and
- Other non-technical reasons.

This section of the report discusses the issue of highway twinning solely from the traffic capacity and traffic level of service perspectives. The complete assessment necessary to identify the need to twin any section of highway must include many other considerations in addition to those conducted relative to traffic capacity and level of service.

In discussing Level of Service (LOS) criteria for twinning of highways, the definitions contained in the *Highway Capacity Manual Special Report 209,* Transportation Research Board were used.

DHT have, in the past, employed a number of criteria to identify the need to twin various highway links. These include a LOS C standard and an ADT $\geq$ 4000. This means that a highway section with a traffic level of service of lower than "C" or

alternatively an average daily traffic volume of greater than 4000, should be considered for twinning. Alberta Transportation and Utilities employ a LOS B standard in assessing long term highway requirements. Manitoba Department of Highways and Transportation use a 20 year forecast LOS B or an AADT of 5000 for their twinning criteria for arterials.

For this study, a LOS B standard was used as a desirable minimum for all highway links. The selection of this standard is described in more detail in ***Chapter 6***. For highway links in semi-urban or urban areas such as those close to the City of Saskatoon, consideration may be given to using a LOS C or lower as a minimum tolerable standard.

The upgrading warrants for intersections are also addressed in ***Chapter 6***.

2.3 Level of Access Control

Current DHT control of access policy is documented in the *Control of Access Manual*. In the manual, several Control of Access Types are defined and assigned to all highways throughout the province.

It is recommended that the basic DHT Control of Access policy and procedures remain unchanged. The application of DHT Control of Access policy will be greatly enhanced however, through the increased ability to forecast future highway traffic volumes, levels of service and improvement requirements.

It is recommended that initially DHT review the existing Control of Access Types for all highways in the study area in conjunction with the Improvement Plans developed in this study. Highways which are forecast to require twinning by 2010 and having a Control of Access designation of Sub Type B-3 or lower, for instance, should be reassessed.

As land use, traffic, level of service and improvement requirement updates are made in the future, an evaluation of access control needs can be made. It is emphasized that, as with the development of twinning warrants, the determination of the appropriate Control of Access Type for a given highway section will require consideration of many factors in addition to those presented in this study.

CHAPTER 3

DATA COLLECTION AND MODELLING

The data collection program and the model calibration were significant components of the study, since they formed the basic input to the improvement plans.

The principal objective of the data collection program was to gather information on travel behaviour on the study area's highways. The main component of the data collection program was a series of roadside origin-destination (O-D) interviews, or surveys. These were supplemented by Automatic Traffic Recorder (ATR) and classification counts, which were used to validate the surveys. The surveys provided the principal input to the model calibration.

An additional product of the data collection program was a database on highway travel characteristics in the study area. These characteristics include data on trip origin, destination and purpose; and on daily travel characteristics. The data can be applied in other transportation planning studies, or for comparative purposes in other analyses. They also provide an update to origin-destination surveys conducted some years ago by DHT.

The calibrated travel demand forecasting model was used to forecast travel on the Provincial highways in the study area. The model simulates 24 hour private vehicle trips on the highways. Forecasts were based upon projections of population and employment, to the years 2000 and 2010. The travel forecasts were then used in a capacity analysis, to identify levels-of-service and capacity deficiencies.

3.1 Data Collection Program

Roadside O-D surveys were conducted at ten locations on the Provincial highway system. The locations were chosen according to travel patterns and problem areas of interest. Eight survey locations formed a cordon around the City of Saskatoon. Two other locations were selected on rural highways within the study area, but outside the Saskatoon commutershed.

The surveys were conducted over several weekdays during October 1990. All survey volumes were calibrated to AADT volumes, rather than summer ADT volumes, since the former are more commonly used for planning purposes. Only private vehicles were surveyed. Heavy trucks and buses were not surveyed, for reasons of practicality and the overwhelming dominance of private vehicles as the mode of intercity passenger transportation. A public relations program was implemented successfully, as a means of alerting drivers and to maximize driver compliance.

Information was gathered on: the type of vehicle; the number of occupants; the trip origin and destination; the main trip purpose; and the number, location and purpose of any intermediate stops and the time of the survey.

Key survey characteristics are summarized below:

- Private vehicles were predominant, representing on average 92% of all valid responses. On average, private vehicles represented 84% of the vehicle mix.

- The average vehicle occupancy rate was 1.6 persons per vehicle. The rates were consistent with the origin-destination and trip purpose mixes, in the sense that short-distance commuter work trips tend to have lower rates (commonly 1 person per vehicle) and long-distance travel tends to be made with 2 or more people in the vehicle.

- On average, 86% of the respondents did not make any intermediate stops during the course of their journey. Of the remainder, 12% made 1 stop. No respondent recorded more than 4 intermediate stops. Just over half of the trips were en-route service stops.

The surveys showed that there were approximately 45,000 private vehicle trips to, from, within and through the study area over the 24 hour period. The predominant trip purpose was the work trip, at approximately 15,000 trips or 33% of the total. Business trips related to work were the next highest category, at 11,000 or 24% of the total. Shopping / personal business trips, and social / recreational trips each represented about 9,000 trips, or 20% of the total. School trips were the smallest category (1,050 or 2% of the total).

Travel in the study area can be categorized into three broad groups:

- **Travel within the study area, oriented to and from Saskatoon.** These constituted the large majority of trips in the study area. They accounted for the many people who live in rural towns and villages outside Saskatoon, and who commute to the city for work or shopping. There is also a smaller reverse commute, notably to the six potash mines in the rural part of the study area. Service vehicles and sales representatives based in Saskatoon also serve communities throughout the study area.

- **Intercity travel between major urban centres.** There is significant intercity travel between Saskatoon and cities outside the study area, such as Regina and Prince Albert. Travel between these major centres is concentrated primarily on key highways, such as Highway 11 north and south of Saskatoon, Highway 16 (west to Edmonton and east to Winnipeg), and Highway 7 (to south-west and Calgary).

- **Travel within the rural zones of the study area.** This was the smallest component of travel in the study area. There is travel among the rural employment and population areas as a function, for instance, of the local trading and service centres.

3.2 Travel Demand Forecasting Model

Travel demand forecasting models are used to forecast travel across a given transportation network, as a function of demographic and network characteristics. The models are commonly used in the analysis of transportation systems across a broad area. This ensures an efficient, systematic, and consistent examination of travel needs throughout the area. The TModel 2 travel demand forecasting model software was selected for this study. Two licenses were purchased on behalf of DHT; the first for the Saskatoon District office and the second for the Departmental offices in Regina.

The basis of the travel demand forecasting model was an O-D table representing all private vehicle trips taken over a 24 hour period. The table was derived from the ten individual roadside surveys, described in the previous section.

DHT applications of the travel demand forecasting model can be classified into two broad groups: forecasts of private vehicle trips on the Saskatoon District's highways, as a function of future population and employment (i.e., the subject of this study); and, tests of the impacts of improvements to the transportation system.

The model has five main categories of input. These are: the 55 zone system (i.e., the study area was divided into 55 zones of analysis, or traffic zones); population and employment data for each zone; a highway link-node network (i.e., a description of the District's highways); observed traffic count data from DHT ATR counts; and, the survey origin-destination table. The highway link-node network includes highway junctions, and control section start and end points.

The model used for the Saskatoon Regional Rural Highway Planning Study consists of three basic steps:

- ***trip generation,*** in which trips are 'generated' as a function of zonal population and employment;

- ***trip distribution,*** in which the generated trips are distributed among the zones to create a simulated origin-destination table; and

- ***trip assignment,*** in which the simulated origin-destination trips are assigned to the highway network.

The link assignment results are the principal model output. The volumes represent 24 hour private vehicle trips in each direction. The simulated link volumes are then input to a capacity analysis function specially coded in DHT's Geographic Information System, or GIS ***(see Chapter 4).*** The function calculates link capacities and levels-of-service, based upon the standard Highway Capacity Manual formulations. A secondary model output is the O-D tables produced in the trip distribution step. These files can be analyzed and modified either in the model or the GIS -- for instance, as part of a policy study, or sensitivity analysis.

CHAPTER 4

MANAGEMENT AND UPDATING STRATEGY

As part of the study, Delcan, in association with Generation 5 Technology Limited of Regina, integrated the calibrated travel demand forecasting model with DHT's GIS. Based upon the integration, a strategy also was developed for managing and updating the data and improvement plan. In this way, DHT staff have both an analytical tool (i.e., the model) that can be used with the corporate GIS, and a strategy for updating data and monitoring trends as travel conditions change and issues evolve.

4.1 Model/GIS Integration

DHT began using a GIS in 1989. By 1990, DHT staff were using the GIS to graphically illustrate and query the corporate databases. As a result, decision-making at DHT is based increasingly upon the GIS. Therefore, the model was integrated with the GIS. The integration ensures that model input and output can be created and updated in a manner consistent with the treatment of other corporate databases. It also broadens the applications of the model, since the model can access a larger number of databases (in addition to the GIS's graphical features).

The integration was based primarily upon the exchange of input and output data files between the travel demand forecasting model and the GIS. In particular, the travel demand model's databases were based upon those of the GIS, to the extent possible. The model's highway network was based upon the description of the highways in DHT's GIS databases. Because the GIS databases represent 'actual' conditions, they served as the basis for the model. Also, various model processes (i.e., trip generation and capacity analysis) were replicated in the GIS.

Figure 4.1 shows the basic model process, its input and its output. In addition to the files exchanged between the two, the figure shows that the trip generation and capacity analysis processes were also implemented in the GIS. This represents a departure from the more common travel demand model formulation. Traditionally, models have been developed as stand-alone tools, often with their own, unique databases. Under the traditional approach, the processes and data files shown in *Figure 4.1* would all be self-contained with the model. The principal benefits of the combined model/GIS approach are that the user is provided greater flexibility for analysis, and can optimize the model's analytical capabilities with the GIS's database management and graphical features. Files exchanged between the GIS and the model are shaded in grey in the figure.

4.2 Parameters for Updating

The types of information to be updated can be categorized into three groups. They consist of both data and model functions. The importance of making these distinctions is that updates to each group will be implemented in different ways. The three groups are discussed below.

4.2.1 Travel Characteristics and Land Use Information

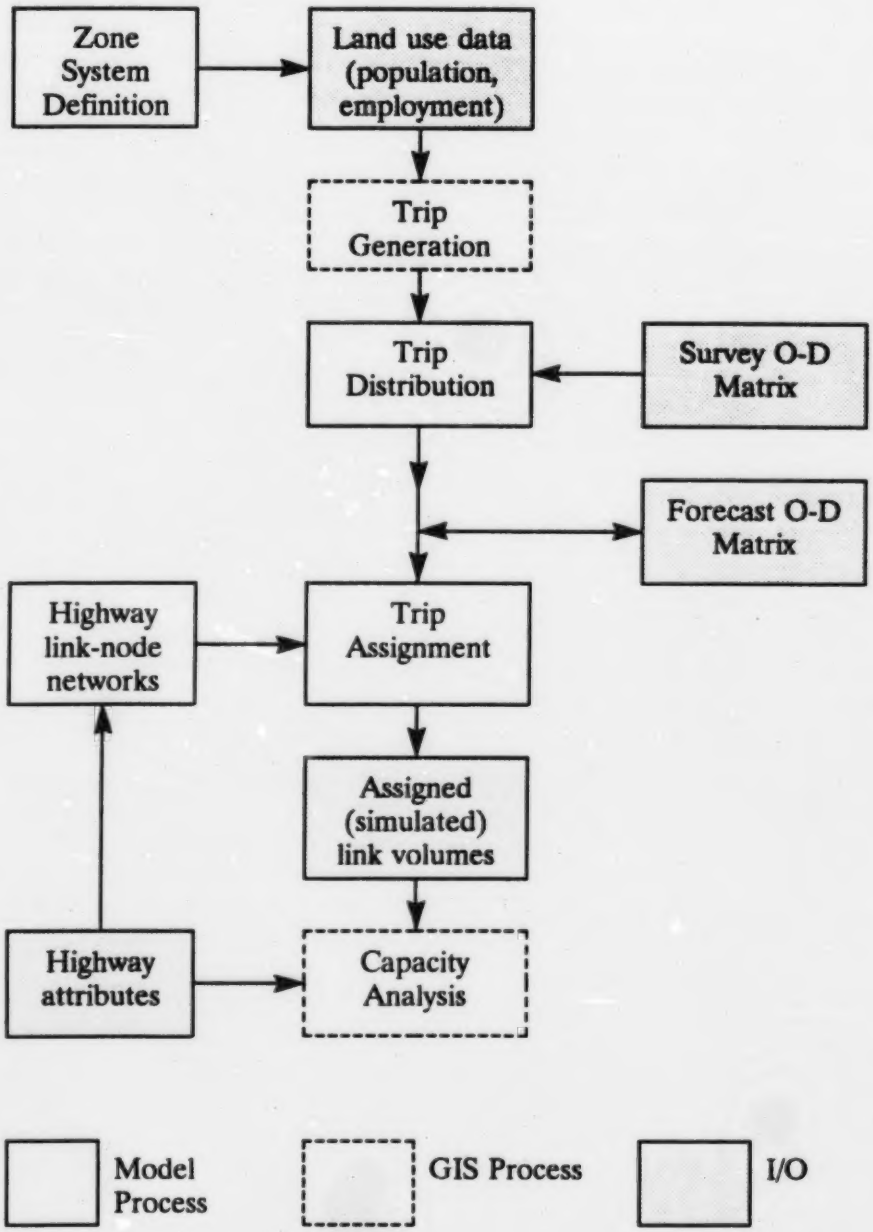
Changes in the travel characteristics and land parameters, which constitute the model input, can directly affect forecasts of travel demand. The parameters include:

- Population and employment and TModel 2
- Zone system area
- Growth trends in through travel
- Changes in interzonal travel characteristics
- New origin-destination data

4.2.2 Highway Network Configuration

The link-node representation of the highway network also is an input to the model. There are two types of changes:

- Changes to existing highways
- Simulation of proposed changes



Note: Shaded boxes denote files input to and output from GIS

SASKATCHEWAN HIGHWAYS AND TRANSPORTATION	MODEL PROCESS, INPUT AND OUTPUT
SASKATOON REGIONAL RURAL HIGHWAY PLANNING STUDY	
Project No. 15-1433	DELCAN ENGINEERS PLANNERS LANDSCAPE ARCHITECTS — FIGURE 4.1

4.2.3 Model Formulation and Assumptions

These directly affect the model structure, and the assumptions upon which it is based. This allows the user to update the model, as new data are gathered and circumstances emerge in the future. The changes can range from the refinement of a particular function (based upon new, detailed information on a specific model component), to the re-calibration of the entire model (based upon new O-D surveys, conducted sometime in the future).

4.3 Future Data Collection

DHT has a comprehensive programme of data collection for transportation planning activities. These include ATR counts, classification data, intersection counts, and selected reports, all of which were used in this study. As noted, at the basis of the model calibration was a series of roadside origin-destination surveys and accompanying ATR and classification counts, conducted specifically for the study.

Future data collection needs, for transportation planning and other forecasting needs in the Saskatoon District, should include the items listed below. It is recognized that the collection of any or all of these data is dependent upon needs, the availability of funds and budget priorities.

- **Updated origin-destination survey:** A roadside interview programme should be conducted in 5 or 10 years. The future surveys would allow time-series comparison to identify changes and trends. With a new survey, the model should be re-calibrated to reflect any changes in travel characteristics.

- **Surveys of other modes:** School buses and trucks also should be surveyed. The surveys would provide a profile of data on these other modes, for application in design and policy decisions. The data would be used to calibrate a parallel model, which could be integrated with the auto model.

- **Intersection count programme:** A regular count programme should be established, to count key highway junctions throughout the study area (or the Province). The purpose is to provide a consistent profile of vehicle turning movements, for identification of future improvements.

- **Classification count program:** A regular programme of classification counts should be conducted at key locations on selected highways. This would complement existing classification count programmes, but would be conducted on a regular basis. The purpose is to provide information on vehicle types. Vehicle occupancy data also should be collected using manual counts. The information is useful in policy planning and analysis.

- **Zonal population and employment data:** Projections of these data were prepared for the years 2000 and 2010. In subsequent years, observed changes in growth rates should be used to revise population and employment projections, as a means of monitoring emerging trends and updating the model travel forecasts as appropriate. The model would be re-run using these data as input, and the results compared with the forecasts for the same years.

4.4 Applications

The model, related databases and the GIS integration were developed for the Saskatoon Regional Rural Highway Planning Study. The databases and these analytical tools allow DHT staff to update the highway plan, as appropriate to needs. However, other applications may be, or are being, considered as well by DHT staff. These include:

- **Province-wide transportation model:** The network would include all Provincial highways throughout . The model would be used for policy decisions, and would allow the preparation of an improvement priority plan for all of the Province. Additional origin-destination surveys would be required -- say, in the Regina District, or throughout all six districts -- to gain at least a representative sampling of travel characteristics throughout the Province.

- **Integration with City models:** O-D surveys and travel demand forecasting models have recently been developed, or are currently being developed, for Regina and Saskatoon. The zone system used for this study is an aggregated version of that used by City of Saskatoon staff (i.e., for the City zones). To account for the interaction between urban and interurban travel, it may be appropriate to integrate the respective survey databases.

- **Modifications to the GIS corporate databases:** In the GIS, the highway network is defined by control section -- in model terminology, it is a link-based system. The model requires a node-based definition. Also, there is no physical connection between the GIS links; whereas the model cannot function without this connectivity. DHT staff have indicated the desirability of connecting the links in the GIS databases, to facilitate the creation of future model networks.

CHAPTER 5

FORECASTING FUTURE TRAFFIC DEMANDS

To understand existing and future transportation needs, knowledge of where people live and work is required. Consequently, major inputs into the transportation planning process were data on both current and projected levels and distribution of population and employment. Data were prepared for the 1990 base year, and for the years 2000 and 2010. The 1990 data were used in the calibration of the travel demand forecasting model. The two projections formed the basis upon which travel demand forecasts were made, again using the model.

The projections incorporated both past trends and projected increases in the working age population and participation rates. ***Table 5.1*** summarizes the study area population and employment data for the 1990 base year, and for the year 2000 and 2010 horizons.

TABLE 5.1
STUDY AREA POPULATION AND EMPLOYMENT LEVELS

Year	Population	Employment
1990	261,600	119,200
2000	299,000	139,900
2010	333,000	169,300

A review of the projections indicates a projected average annual population increase of 1.3%, over the twenty year period. Employment was projected to grow at an annual rate of 1.8%, over the same period. Also noteworthy is the continued dominance of the City of Saskatoon as both a population and employment centre. Despite growth outside the City, that Saskatoon's proportion of population was expected to increase from 70% in 1990 to 75% in the year 2010. Employment was expected to increase from 75% in 1990 to 80% in the year 2010.

The two zonal population and employment forecasts were then applied to the calibrated model, to create forecasts of travel on the study area highways. Travel on study area highways was expected to grow from approximately 45,000 24 hour auto-vehicle trips in 1990, to 55,000 trips in the year 2000 and 65,000 trips in the year 2010. These trips reflect the surveyed volumes with adjustments to include vehicle trips made through unsurveyed locations. The average annual growth rate between 1990 and both 2000 and 2010 was determined to be 1.9%. The projected growth in travel is shown on ***Figure 5.1.*** Note that all data shown in the figure are based upon model simulations. This explains the slight discrepancy in the 1990 volumes compared with the observed ***(see Section 3.1).***

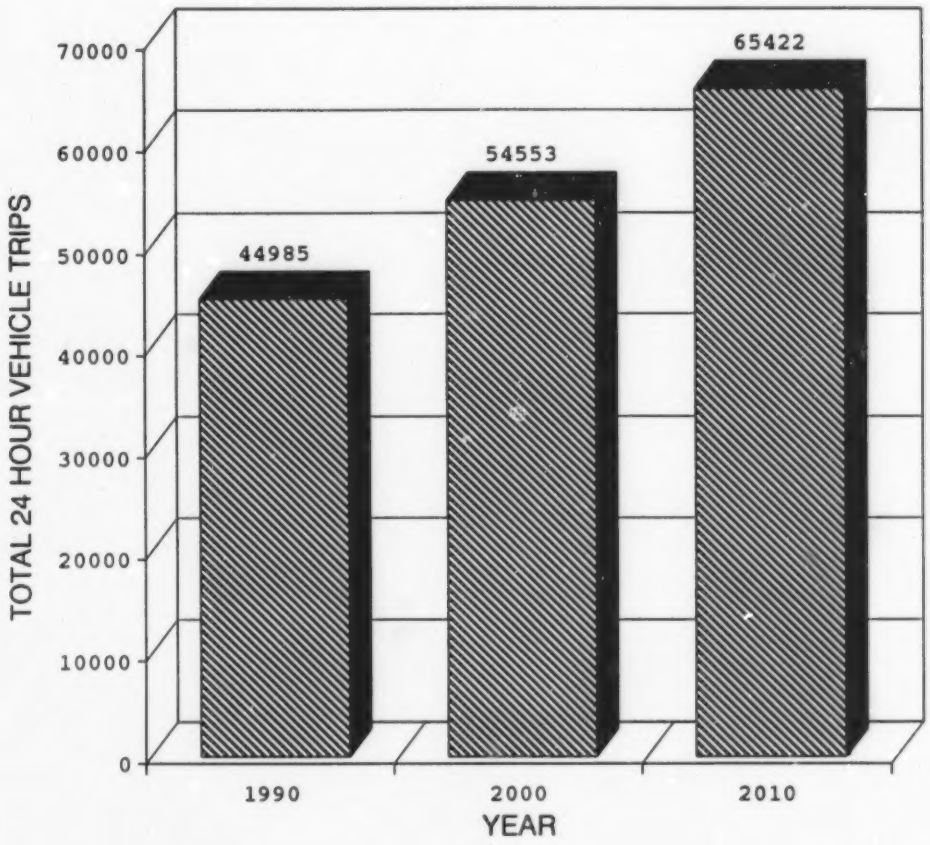
Matrices for the years 1995 and 2005 were then created as linear interpolations of the base year, 2000 and 2010 matrices. Each of the resultant four forecast matrices was then assigned to the highway network.

The forecast traffic demand volumes are daily (24 hour) personal vehicle trips and do not include commercial vehicle trips. Historical DHT data and vehicle classification counts taken at the survey stations were used to convert personal vehicle trips to total vehicle trips. Approximately 13% of the total traffic stream is commercial vehicle trips. This component was accounted for during the detailed analysis.

The detailed analysis was carried out using design hourly volumes. The existing and forecast AADT volumes were converted to design hourly volumes by estimating the 30th highest hour annually. This is the hourly volume which is exceeded in only 29 other hours annually. This design criteria is a common one and is applicable to the study volumes. From hourly traffic counts at five ATR stations in the study area, it was determined that the 30th highest hourly volume is 15% of the average daily volume.

On a few road links than average differences were noted between the simulated and observed AADT volumes. Some of these differences were resolved through further model calibration. Other differences were resolved by applying an appropriate factor to the simulated volumes. Growth rates as determined by the simulated volumes were then applied to develop forecast volumes.

24 HOUR VEHICLE TRIP PROJECTIONS



SASKATCHEWAN HIGHWAYS AND TRANSPORTATION		24 HOUR VEHICLE TRIP PROJECTIONS
SASKATOON REGIONAL RURAL HIGHWAY PLANNING STUDY		
Project No. 15-1433	DELCAN ENGINEERS PLANNERS LANDSCAPE ARCHITECTS	FIGURE 5.1

CHAPTER 6

ANALYSES OF TRAFFIC FORECASTS

The estimated traffic forecasts prepared were analyzed to determine the type, the extent and twinning of improvements required to the highway network system.

6.1 Analyses of Highway Links

The two-lane and multi-lane highways in the study area were analyzed to determine the traffic level of service they will provide in future years. The traffic level of service standard used in this study is LOS "B", as defined by the 1985 Transportation Research Board Highway Capacity Manual (TRB HCM). For multi-lane highways, this standard reflects: reasonably free flow conditions; average speeds of over 90 km/h; good manoeuvre ability in the traffic stream; and a high level of physical and psychological driver comfort. For two-lane highways, LOS "B" is characterized by: 90 km/h speeds on level terrain; some passing required to maintain speed; passing demand approximately equals availability of passing; and drivers are delayed up to 45% of the time on average.

In analyzing the study area highway links, the following existing conditions were recognized:

- existing highway lane and shoulder widths;
- passing opportunities available;
- direction distribution of traffic;
- percent of heavy vehicles; and
- general terrain type.

The highway link traffic analysis provided the following results:

- Currently **(1990)**, substantial segments of many highways are operating below the desired level of service. In particular, portions of Highway 5 and Highway 7 near Saskatoon and Highway 11 and Highway 12 north to Highway 305 are operating at well below the desirable minimum standard.

- By the year **(2000)**, under increased traffic loads, lower than desirable operating conditions will be experienced over an even greater area than that for 1990, particularly on Highway 7, Highway 12 north to Martensville and Highway 11 at Warman will operate under extreme congestion.

- By the year **(2010)**, as traffic volumes continue to increase, the following highway sections are forecast to operate at capacity (extreme congestion):

  - Highway 5: From Saskatoon to Highway 41;
  - Highway 7: From Saskatoon to Highway 60;
  - Highway 11: From Highway 12 to Highway 305 (Warman); and
  - Highway 12: From Highway 16 to Martensville.

6.2 Analyses of Highway Intersections

Essentially all major intersections in the study area were analyzed. One site which was not assessed in this study was the intersection of Highway 12 and the main access to the Town of Martensville. Analysis of this intersection alone is not meaningful as a number of adjacent intersections exist on Highway 12 and a nearby service road through which traffic can and does bypass the main intersection.

Of the thirty intersections analyzed, capacity problems (LOS D or lower) for individual movements or approaches were identified at only five locations. The intersections, the movement or approach in question and the year when LOS D is first predicted to occur are summarized in ***Table 6.1.***

TABLE 6.1
INTERSECTIONS WITH LOS D

Location	Traffic Movement	Year (LOS D)
Highway 5/Highway 41	Southbound Approach	1990
Highway 11/Highway 305	Eastbound Left & Through	1990
Highway 11 and M.R. 785	Eastbound Left Westbound Left	2000 2010
Highway 7/Highway 14	Eastbound Approach	2000
Highway 11/Highway 312	Eastbound Left	2010

Signalization of some of these intersections may not be required as soon as indicated if highway twinning takes place. Twinning is identified in the Highway Improvement Plans for Highway 5 at Highway 41 in 1990; for Highway 7 at Highway 14 in 1990 and for Highway 11 at Highway 305 in 1995. In the case of the Highway 7 and 14 intersection, for example, if the Highway 7 twinning takes place in the near future, the intersection operation may then not drop to LOS D by 2000. Twinning will generally improve the operation and level of service of the intersections. Signalization of all of the above intersections will result in LOS C or better operation in 2010.

The impact of future traffic growth on two existing interchanges within the study area was reviewed. The interchanges are located at the junction of Highways 11 and 12 and Highways 11/12 and 16, both immediately north of Saskatoon.

Interchange at Highways 11 and 12: The section of Highway 11/12 south of the interchange is already twinned. Highways 11 and 12 to the north are presently undivided. The section of Highway 12 to the north of the interchange is recommended to be twinned in 1990 (immediately). Similarly, the section of Highway 11 north of the interchange is recommended to be twinned by 1995. The existing interchange will eventually require upgrading to allow two through lanes for Highway 12 northbound traffic and two through lanes for Highway 11 southbound traffic. It is recommended that this upgrading take place in conjunction with the twinning of Highways 11 and 12.

Interchange at Highways 11/12 and 16: Highway 16 is presently twinned both north and south of the interchange but is restricted to one lane in the westbound direction through the immediate interchange area. Highway 11/12 is already twinned north of the interchange. Analysis of the forecast traffic volumes indicate that the existing interchange configuration will, from a capacity perspective, provide an acceptable level of service to the year 2010 and beyond. The interchange may be upgraded in future for a variety of reasons such as a result of operation difficulties (such as merging or diverging) or as a result of a policy decision. It is recommended that the excess capacity of the interchange be monitored regularly through the annual collection and analysis of field count data.

CHAPTER 7

DEVELOPMENT OF IMPROVEMENT PLANS

As the traffic volumes on the highway system increase it is inevitable that the level of service to the driver will decrease unless improvements are made. To maintain or improve (to minimum standards) existing or predicted future levels of service, highway improvement strategies were developed and reasonably applied.

In this section of the report four improvement strategies have been developed and defined. It is emphasized that the strategies presented are meant to be used as planning tools to help identify what the future overall highway requirements will be. Local or site specific changes, additions and improvements beyond the definition of these strategies will undoubtedly also be needed.

7.1 Highway Improvement Strategies

The proposed improvement strategies considered were:

- **No Action Required:** This strategy means that, on a specific highway link, no continuous, capacity related improvements are necessary. Selected local improvements may still be required however for the time being.

- **Widen Lanes and Shoulders:** This strategy means simply, that all substandard width highway lanes and shoulders on a specific highway link, will be widened to the appropriate standard. From a traffic capacity analysis standpoint, a 3.70 m lane width and 1.80 m shoulder width are considered minimum standards by HCM.

- **Spot Geometric Improvements:** This strategy may include improvements such as flattening horizontal and vertical curves; lowering gradients; improve, relocate or eliminate intersections. The major improvement approach proposed in this strategy is the development of passing lanes. Passing lanes are added, periodically, to each side of the existing two lane undivided highway.

- **Twin Highway:** This strategy consists of the development of a second separate roadway to form a four lane divided highway cross section. Upgrading of lane and shoulder widths on the existing roadway, as necessary, is achieved under earlier applied strategies. If passing lanes have been previously added, they would be removed in conjunction with the twinning.

7.2 Intersection Traffic Capacity Analysis

A traffic capacity analysis was conducted at thirty intersections located throughout the study area. An attempt was made to analyze all the highway/highway intersections for those highways under study plus some selected intersections near rural population centres. One site which was not analyzed is the main access to the Town of Martensville from Highway 12. As noted in ***Chapter 6***, due to the existing road network configuration, the forecast traffic volumes on Highway 12 and the proximity to Saskatoon, this location warrants a more detailed traffic review study beyond that possible within the scope of this study.

Generally, from a traffic capacity standpoint, all the intersections analyzed are currently operating at an acceptable level of service. The analysis of the 2000 and 2010 forecast traffic volumes reveals that almost all intersections will also operate satisfactorily under these future conditions. Some individual movements or approaches are predicted to operate at LOS D or lower. No site specific improvements are recommended but rather the capacity analysis flagged areas where potential improvements may be needed. In order to maintain a LOS C or higher, signalization will be required by 2010 at the following intersections:

- Highway 5/Highway 41;
- Highway 11/Highway 305;
- Highway 11/M.R. 785; and
- Highway 7/Highway 14.

Of course, any capacity related intersection improvements must be considered with other site specific conditions such as; existing operating conditions; existing development levels and constraints; existing access levels and restrictions and long term highway network and land use development.

7.3 Highway Improvement Plans

The application of the highway improvement strategies to all the study area highway links for the 1990, 2000 and 2010 planning horizons is illustrated in ***Figures 7.1 to 7.3*** inclusive as Highway Improvement Plans. Some selective adjustments have been made to the application of the strategies in certain conditions.

Two conditions were considered. The first was to identify where, on any given highway link or links, the analysis indicated the need for construction of passing lanes in one planning horizon and the subsequent need for twinning of the same highway in a subsequent planning horizon. This condition was found to occur in portions of three highways: Highway 7, Highway 11 and Highway 16. The proposed passing lanes were retained in the plan if twinning was not required for at least ten (10) years.

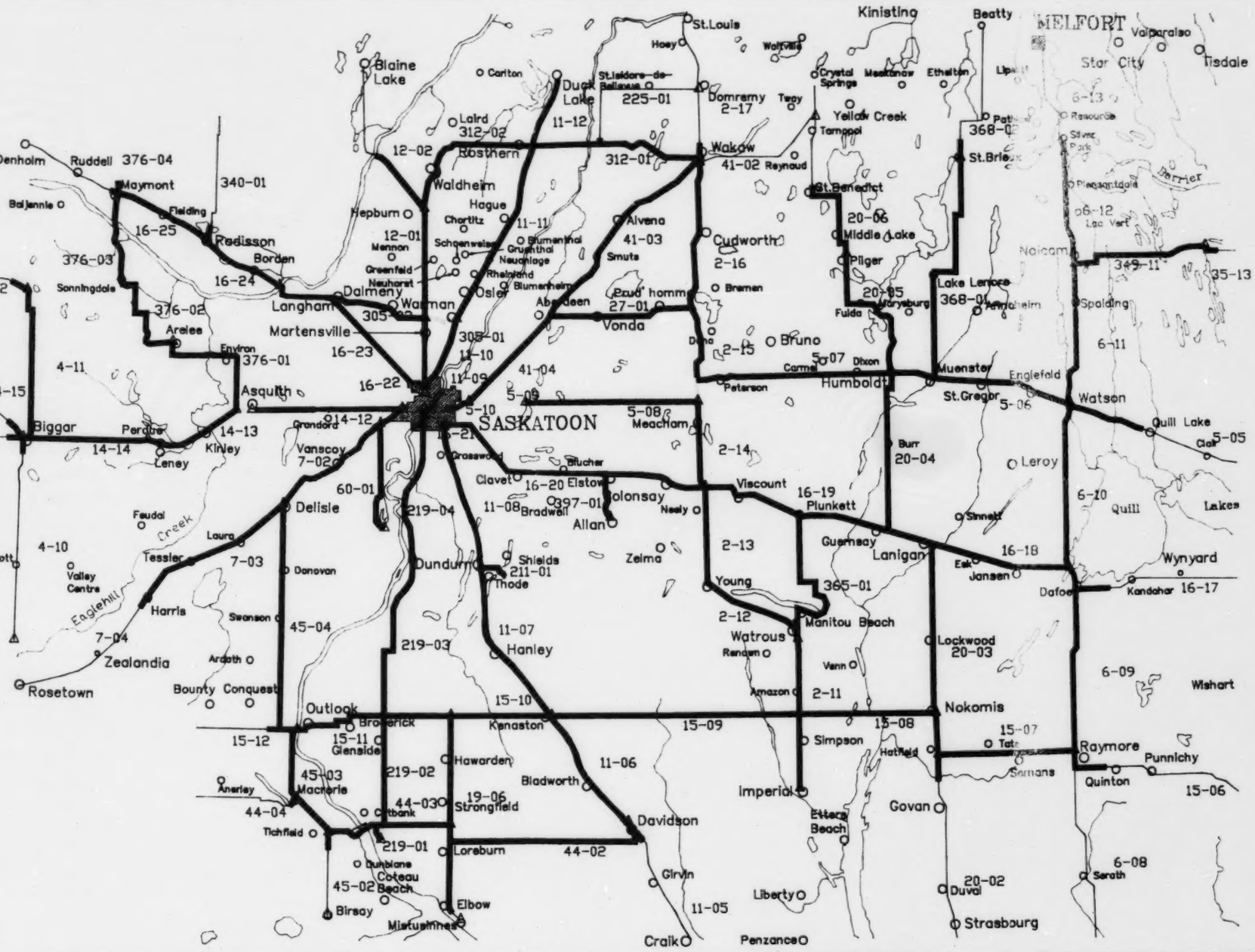
The condition where consideration was given to alter the direct application of the improvement strategies is when the forecast design hour volume is just under or just over the requirement for twinning of a specific highway link at one of the planning horizons. The minimum two-way design hourly volume for which twinning is required is 1,080 vph. A range of +- 5%, or 54 vph, was used to define the range. Essentially, this is a consideration of whether or not the twinning should be either advanced or deferred slightly. This condition exists at seven locations in various planning horizons. Generally, the timing of the proposed twinning was left unchanged with one exception. The proposed twinning of a portion of Highway 16 near the Highway 11 interchange has been included in the 2010 Highway Improvement Plan even though the forecast traffic volume is 1% less than the minimum required.

7.4 Capital Cost Estimates

In order to put a financial perspective on the proposed Improvement Plans, capital cost estimates have been prepared for each highway link improvement for each planning horizon. Details of the cost estimates are provided below.

7.4.1 Unit Costs

Capital cost rates per kilometre of highway were supplied by DHT for the widening, passing lane and twinning improvement strategies. The costs are in 1991 dollars and are exclusive of engineering and land acquisition costs.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Wolfville
St.Isidore-de-Bellevue
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225-01
Domremy
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Tway
Kinistino
Crystal Springs
Meacham
Ethelton
Beatty
Yellow Creek
Tarpool
Pathlow
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St.Brieux
MELFORT
Valparaiso
Star City
Tisdale
Resource
Silver Park
Pleasantdale
Lac Vert
Parrier
St.Benedict
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Middle Lake
Pliger
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349-11
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Viscount
16-19
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Esk
Sinnett
Quill Lake
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Quill
Lakes
Wynyard
Dafoe
Kandahar
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Lac Vert
Manitou Beach
365-01
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Zealandia
Rosetown
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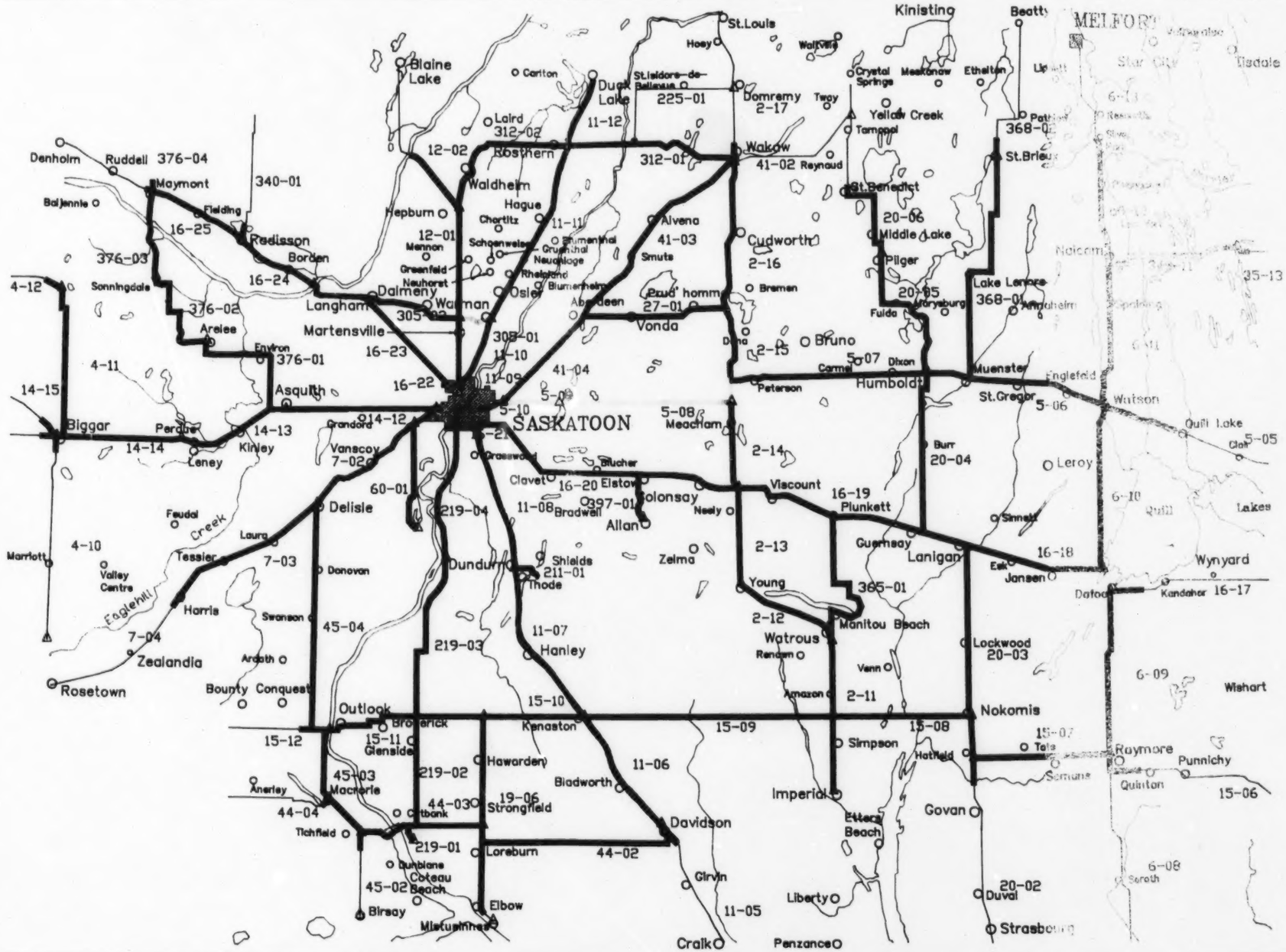
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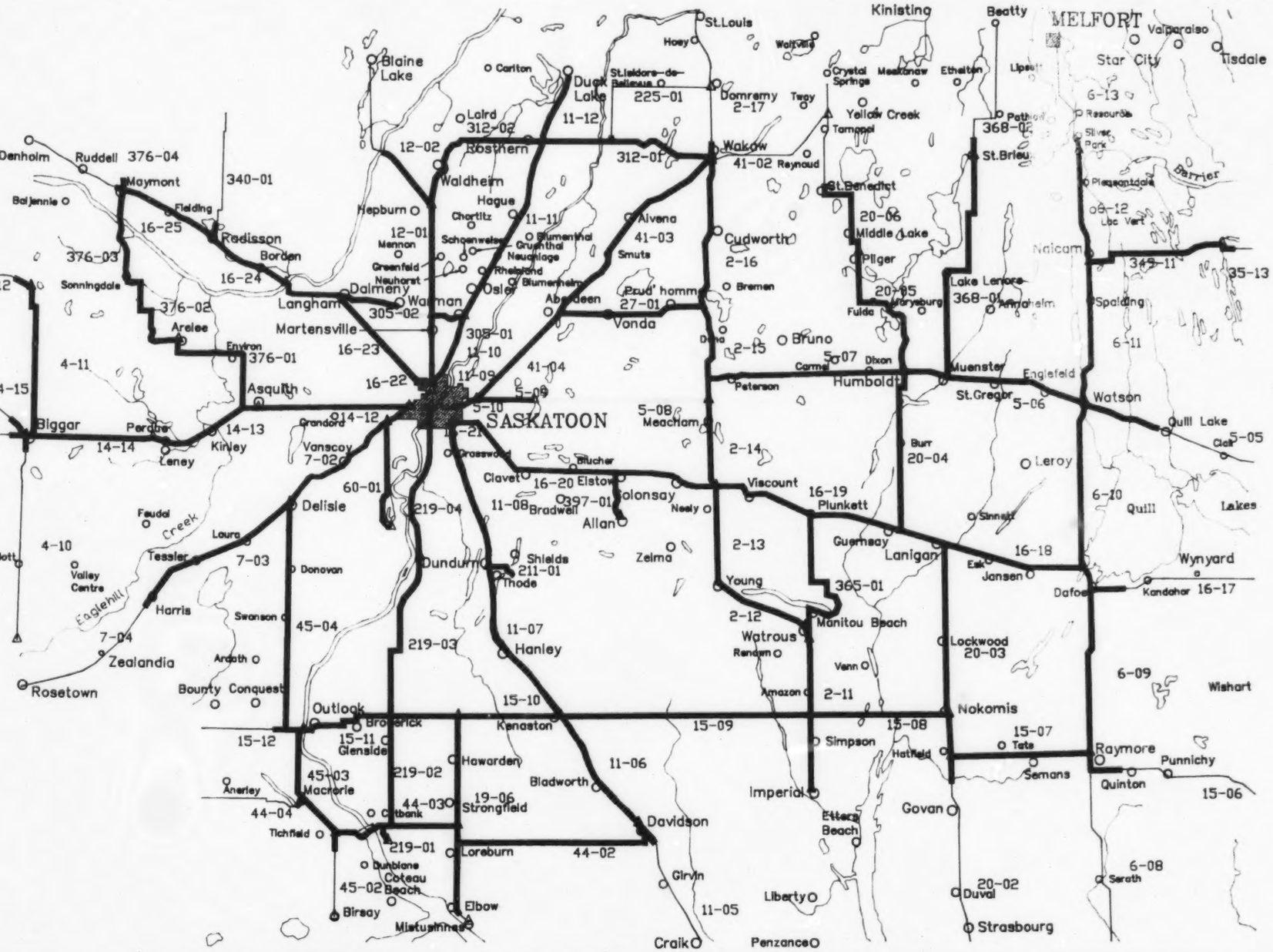

LEGEND

IMPROVEMENT STRATEGY

- No Action Required . . . . . ▬
- Widen Lanes and Shoulder . . . . ▬
- Spot Geometric Improvements . . ▬
- Twin Highway . . . . . ▬

SASKATCHEWAN HIGHWAYS AND TRANSPORTATION

SASKATOON REGIONAL RURAL HIGHWAY PLANNING STUDY

2010

HIGHWAY IMPROVEMENT PLAN

Project No. 15-1433

DELCAN ENGINEERS / PLANNERS LANDSCAPE ARCHITECTS

FIGURE 7.3

The cost rates supplied are as follows:

- **Widen Lanes and Shoulders:** $65,000.00/km: Estimated construction cost to increase existing lane widths to 3.70 m and existing shoulder widths to a minimum of 1.80 m and a maximum of 3.0 m.

- **Spot Geometric Improvements:** $40,000.00/km: Estimated construction cost to add one passing lane in each direction over 20% of the highway link length, assuming existing lane and shoulder widths are adequate.

- **Twinning:** $300,000.00/km: Estimated construction cost to add an additional two lane roadway.

7.4.2 Estimated Costs of Improvement Plans

The estimated capital costs of the three Highway Improvement Plans are given in ***Tables 7.1*** and ***7.2***. In ***Table 7.1***, the costs have been identified by Improvement Plan and by improvement strategy and are derived assuming an "unimproved" or existing road network for each planning horizon. ***Table 7.2*** provides the cost estimates again by Improvement Plan and improvement strategy but the costs shown are incremental and assume that previously recommended improvements have been made.

The total cost of the improvements in ***Table 7.2*** is $2,214,000.00 higher than in ***Table 7.1*** because in the "incremental" case (***Table 7.2***), more passing lanes are constructed and also some of these are subsequently removed.

TABLE 7.1
ESTIMATED "UNIMPROVED" CONSTRUCTION COSTS
SUMMARY
(IN 1,000'S OF 1991 DOLLARS)

Improvement Strategy	1990	2000	2010
Widening	1,970	4,627	3,244
Spot Geometric Improvements	4,844	8,400	19,816
Twinning	6,300	10,800	25,230
Total	13,114	23,827	48,290
Note: Estimated costs do not include allowances for land acquisition and engineering.			

TABLE 7.2
ESTIMATED "INCREMENTAL" CONSTRUCTION COSTS SUMMARY
(IN 1,000'S OF 1991 DOLLARS)

Improvement Strategy	1990	2000	2010
Widening	1,970	2,958	3,393
Spot Geometric Improvements	4,844	3,256	8,564
Twinning	6,300	4,500	14,719
Total	13,114	10,714	26,676
Grand Total			50,504
Note:	Estimated costs do not include allowances for land acquisition and engineering.		

The following three tables ***(Table 7.3 to Table 7.5)*** provide a detailed listing of the proposed improvements for each highway control section and for each planning horizon year. The length of the section, the improvement type and the estimated cost of the improvement are given. The estimated costs are based on the "incremental" approach, the same approach that was used in developing ***Table 7.2***.

TABLE 7.3
1990 IMPROVEMENT REQUIREMENTS

Highway Control Section	Length (km)	Improvement Type	Cost ($ x 1,000)
2-15	5.6	Widen Lanes & Sh.	364
5-08	1.0	Widen Lanes & Sh.	65
5-09	11.4	Widen Lanes & Sh.	741
5-10	0.1	Twin Highway	30
5-10	5.6	Twin Highway	1,680
5-10	0.1	Twin Highway	30
7-01	6.0	Twin Highway	1,800
7-02	1.0	Add Passing Lanes	40
7-02	28.0	Add Passing Lanes	1,120
12-01	9.2	Twin Highway	2,760
14-12	20.0	Add Passing Lanes	800
14-13	1.3	Widen Lanes & Sh.	85
14-13	3.3	Widen Lanes & Sh.	215
16-20	20.7	Add Passing Lanes	828
16-20	14.0	Add Passing Lanes	560
16-20	5.8	Add Passing Lanes	232
16-23	12.3	Add Passing Lanes	492
16-24	1.0	Add Passing Lanes	40
16-24	18.3	Add Passing Lanes	732
305-01	7.7	Widen Lanes & Sh.	501
Total			13,114
Note:		Estimated costs do not include allowances for land acquisition and engineering.	

TABLE 7.4
2000 IMPROVEMENT REQUIREMENTS

Highway Control Section	Length (km)	Improvement Type	Cost ($ x 1,000)
5-07	0.5	Widen Lanes & Sh.	33
5-08	39.8	Widen Lanes & Sh.	2,587
6-10	4.0	Widen Lanes & Sh.	260
6-10	1.2	Widen Lanes & Sh.	78
11-10	14.8	Twin Highway	4,440
11-10	0.1	Twin Highway	30
11-10	0.1	Twin Highway	30
11-11	21.5	Add Passing Lanes	860
12-01	3.2	Add Passing Lanes	128
14-13	1.3	Add Passing Lanes	52
14-13	3.3	Add Passing Lanes	132
16-25	1.0	Add Passing Lanes	40
16-25	23.7	Add Passing Lanes	948
16-25	1.5	Add Passing Lanes	60
41-04	25.9	Add Passing Lanes	1,036
Total			10,714
Note:		Estimated costs do not include allowances for land acquisition and engineering.	

TABLE 7.5
2010 IMPROVEMENT REQUIREMENTS

Highway Control Section	Length (km)	Improvement Type	Cost ($ x 1,000)
2-15	5.6	Add Passing Lanes	224
5-06	10.1	Add Passing Lanes	404
5-07	1.0	Widen Lanes & Sh.	65
5-07	42.1	Widen Lanes & Sh.	2,737
5-07	0.5	Add Passing Lanes	20
5-07	1.0	Add Passing Lanes	40
5-07	42.1	Add Passing Lanes	1,684
5-09	11.4	Add Passing Lanes	456
6-10	4.0	Add Passing Lanes	160
6-10	1.2	Add Passing Lanes	48
7-02	1.0	Twin Highway	306
7-02	28.0	Twin Highway	8,568
11-11	21.6	Add Passing Lanes	864
11-12	18.1	Add Passing Lanes	724
14-12	13.0	Add Passing Lanes	520
16-18	1.7	Add Passing Lanes	68
16-18	7.4	Add Passing Lanes	296
16-18	1.0	Add Passing Lanes	40
16-19	22.1	Add Passing Lanes	884
16-19	0.9	Add Passing Lanes	36
16-19	21.7	Add Passing Lanes	868
16-20	7.2	Add Passing Lanes	288
16-20	15.0	Add Passing Lanes	600
16-20	0.8	Add Passing Lanes	32
16-20	5.8	Twin Highway	1,775
16-23	12.3	Twin Highway	3,764
16-24	1.0	Twin Highway	306
305-01	7.7	Add Passing Lanes	308
305-02	9.1	Widen Lanes & Sh.	592
Total			26,676

Note: Estimated costs do not include allowances for land acquisition and engineering.

CHAPTER 8

PUBLIC PARTICIPATION PROGRAM

A public participation program was undertaken to make the public aware of the study and its objectives, and to provide an opportunity for the public to contribute their views and suggestions in a systematic and positive manner.

The public was provided with two opportunities to contribute their views and suggestions for this study. In December of 1990, a questionnaire was sent out to towns, rural municipalities, and selected interest groups asking for their input on a number of issues related to the Saskatoon Regional Rural Highway Planning Study. In July of 1991, a public meeting was held in Saskatoon to review the progress of the study and to provide another opportunity for the public to express their opinions on study related issues.

8.1 Public Participation Process

In December of 1990, questionnaires were sent to local towns, villages, and rural municipalities area representatives, and interest groups within the Saskatoon study area. A total of 145 questionnaires were sent out inviting responses to the questionnaire. A total of 60 questionnaires were returned which represents a return rate of approximately 41 percent. This is a fairly high return rate for a questionnaire of this nature and is indicative of the public interest in providing input to the study.

In July of 1991, a public meeting was held. All communities, rural municipalities, selected groups and agencies that were sent the December, 1990 questionnaire, were invited to send a representative to the meeting. The purpose of the meeting was to obtain public input on the alternative solutions developed for the highway transportation issues. There were 38 attendees at the public meeting. This represents a participation rate of approximately 26 percent from the 145 invitations sent out. Considering the meeting was held in peak vacation season, the attendance was fairly good.

Those attending the meeting were asked to complete a short questionnaire and either mail it in or leave the completed questionnaire at the meeting. Respondents were asked to rank the major transportation issues identified in the December, 1990 questionnaire in order of importance.

8.2 Summary of December 1990 Questionnaire Results

a) The **Transportation Issues** which received the highest rankings were:

- Improve intersections (add turning lanes, improve sight distance, install warning lights, interchanges)
- Twin various highways
- Widen various highways
- More resurfacing or rehabilitation needed

b) The **Safety Issues** which received the highest rankings were:

- Narrow highways with no shoulders
- Improve road maintenance
- Twinning highways would improve safety
- Add turning lanes at intersections
- Other intersection concerns (problems crossing with high-speed traffic, should have 90° intersections)

c) The Saskatoon region highway system received an average or better rating from 66% of the survey respondents.

d) The least liked aspects of the existing highway system were given as:

	Responses	%
• Deteriorated highways	18	32.7
• Narrow highways, no shoulders (Highway 5, 20)	14	25.5
• Undivided highways north of Saskatoon	4	7.3

8.3 Summary of Public Meeting Questionnaire and Results

a) The major **Transportation Issues** identified according to rank were:

- Construct passing lanes on busy highways
- Twin Highway No. 16 west to North Battleford
- Twin Highways north of Saskatoon (Highway No. 12 to Martensville and Highway No. 11 to Rosthern)
- Improve highway intersections (turning lanes, lights)

b) The strategies to improve highway safety identified according to rank were:

- Twin busy highways
- Add turning lanes at intersections
- Widen narrow highways and shoulders
- Construct passing lanes to improve safety

c) Seventy-seven (77) percent of the questionnaire respondents were in agreement with the highway improvement solutions presented.

CHAPTER 9

MODEL TRAINING PROGRAM

Delcan conducted a model training program for DHT staff in July, 1991. The two TModel 2 software licenses were implemented by DHT staff, with assistance from Delcan. The training covered the use of the calibrated travel demand forecasting model and the TModel 2 software ***(see Chapter 3).*** Documentation was provided during the training. It consisted of the ***TModel 2 User's Manual,*** and the ***NCAP Intersection Capacity Analysis Manual,*** both of which were provided with the software; and a specially prepared handout of course notes, specific to the model calibrated for the study. Generation 5 Technology Limited also provided training on the use of the GIS software developed as part of the study. The software is applied to the integration of DHT's Geo/SQL GIS and the calibrated model. This training was conducted by Generation 5 Technology Ltd., proprietors of Geo/SQL. Generation 5 also prepared and distributed the ***TModel 2 Geo/SQL Interface - User Reference Manual.***

CHAPTER 10

SUMMARY OF RECOMMENDATIONS

This chapter provides a summary of the major recommendations of the Saskatoon Regional Rural Highway Planning Study. Details of the information upon which the recommendations are based may be found in the study Technical Report.

The following major recommendations are a result of the **Saskatoon Regional Rural Highway Planning Study**:

1. That the Saskatchewan Highways and Transportation desirable minimum highway design standards be changed as described in ***Section 2.1*** of this report.

2. That a data collection and model updating program as detailed in ***Section 4.3*** of this report be implemented and maintained.

3. That the major arterials, minor arterials and collector highways within the study area be upgraded to the level shown on the 1990 Highway Improvement Plan indicated on ***Exhibit 7.1*** of this report consistent with Saskatchewan Highways and Transportation current level of service policy.

4. That the Highway Improvement Plans, as shown on ***Exhibits 7.1, 7.2 and 7.3*** of this report be updated in the future as required and as a result of the recommended model updating and data collection program.

5. That the major arterials, minor arterials and collector highways within the study area be upgraded from the 1990 Highway Improvement Plan to:

   - The 2000 and 2010 Highway Improvement Plans as indicated on ***Exhibits 7.2, and 7.3*** of this report; or

   - Future updated versions of the 2000 and 2010 Highway Improvement Plans.

6. That the intersections of Highways 5 and 41; Highways 11 and 305 and Highway 12 and the access(es) to Martensville be the subject of further detailed study to identify what highway improvements are required to achieve the proper standards related to capacity, operation, safety, land use and control of access.

7. That consideration be given by Saskatchewan Highways and Transportation to the investigation of the use of a lower Level of Service planning standard (lower than LOS B) for highway capacity in urban and semi urban areas.